

Narrative for Cedar River  
National Grassland, Sioux and Grant Counties, North Dakota

Introduction

The Cedar River National Grassland (CRNG) consists of approximately 6720 acres in Sioux and Grant Counties, North Dakota. The Grant County acreage is a single parcel of 480 acres in sec. 20, T. 130 N., R. 87 W. The remaining 6240 acres are in Sioux County and within the boundary of the Standing Rock Indian Reservation. A concentration of 3840 acres is in T. 129 N., R. 89 W. The remaining 2400 acres consists of widely scattered, non-contiguous parcels of 160 to 800 acres in size. The total areal extent of the CRNG is 31 miles in an east-west direction and 9 miles in a north-south direction. The individual parcels are shown on the Forest Service visitors map (1981) titled Grand River-Cedar River National Grasslands.

There are no U.S. highways through the CRNG although U.S. 12 is only 1 mile south of the North Dakota-South Dakota state line. State Highway 31 crosses the area in a north-south direction through R. 85 W. There are improved (graded and/or graveled) roads in some areas but mostly the routes are primitive. However, all tracts can be accessed, weather permitting, with the possible exception of the SW of sec. 33, T. 129 N., R. 87 W.

The principal drainage is Cedar Creek (river) which flows from west to east-northeast through the CRNG. Many of its tributaries are intermittent.

There are no towns in the CRNG. There are several small towns in South Dakota along U.S. 12, including McIntosh, Morristown and Watauga, in diminishing size order.

The rocks exposed on the surface of the CRNG are Paleocene Cannonball and Ludlow formations and the Upper Cretaceous Hell Creek formation. All age Periods are represented in the subsurface from Quaternary through Cambrian.

Structurally, CRNG is on the southeast flank of the Williston Basin. The regional dip is N. 60 W. at a very gentle rate. The Cretaceous Greenhorn dips northwest at 10 feet/mile, the Ordovician Red River dips 38 feet/mile and the Precambrian at about 60 feet/mile.

Drilling depth to Precambrian at sec. 7, T. 129 N., R. 84 W. is about 7600 feet. In sec. 31, T. 129 N., R. 89 W. the depth to Precambrian is about 8600 feet, an increase in total sedimentary section of about 1000 feet. The structural datum on the Greenhorn in sec. 7, T. 129 N., R. 84 W. is -300 while in sec. 31, T. 129 N., R. 89 W. it is -625. This thinning toward the margin of the Williston Basin is depositional in some intervals, such as the Eagle-Shannon which thins 70 feet between the Ardmore bentonite and the Niobrara. The thinning is also erosional along numerous unconformities, some of which occur between Periods, such as between the Triassic and the Jurassic. Others may occur between formations within an epoch. One potentially important example may occur at the top of the Ordovician Red River formation which is overlain by the Ordovician Stoughton shale member of the Stony Mountain formation. Compare the Shell 21-35 BN, sec. 35, T. 131 N., R. 88 W., Grant County, North Dakota, with the Bartlett 1 Guyer, sec. 20, T. 23 N., R. 23 E., Corson County, South Dakota, a distance of 22 miles. The interval from the top of the Red River to the base of the "C" zone anhydrite is 95 feet thick in the Shell well and 60 feet thick in the Bartlett well. The porous interval is 16 feet thick in the North Dakota well and 13 feet thick in the South Dakota well. Correlation indicates that this porous interval occurs at a different level in these two tests. The porous interval at 6470 (-4140) in the Bartlett 1 Guyer seems to correlate with 7570 (-5072) in the Shell 21-35 BN. well, about 30 feet below the good porosity zone in the Shell well. This good porosity zone is, therefore, apparently truncated in an updip direction by the unconformity at the Red River top. Utilizing the gentle structural nosing displayed at Greenhorn depth, there are four areas where stratigraphic trapping of oil and gas might be anticipated in this Red River porosity truncation. The regional dip becomes stronger with depth and the definition of the axis of the structural noses at Red River depth would probably need to rely on seis. Whether the area of truncation could also be seismically ascertained is questionable. Two or more wells per structural nose might be needed to find these traps. Recoverable reserves of 1 million to 4 million barrels of oil can be anticipated in each trap. About 480 acres of CRNG lands appear to be prospective in T. 129 N., R. 87 W., Sioux County, North Dakota. Drilling depth to test Red River would be about 6900 feet.

Occurrence Potential

The occurrence potential in this area is hereby classified as "MODERATE" to "LOW." Although there have been 23 reported oil and/or gas shows in 5 formations, there is no established production. The nearest is over 60 miles to the south in the southwest corner of Dewey County at Lantry field. Production is from the "C" zone of the Ordovician Red River formation at a depth of about 5000 feet. Red River production also occurs about 70 miles west, on the southwest flank of the Williston

Basin, from a number of fields at depths of about 8500 feet.

In a very gross fashion, the wells reporting oil and/or gas shows can be aligned in a northeast-southwest direction that parallels the Greenhorn structure contours and the total sedimentary thickness isopachs. This parallelism has been used to delineate "MODERATE" occurrence potential from "LOW" occurrence potential areas.

#### Development Potential

On the 15-township area encompassing, and immediately adjacent to, the CRNG, there have been 7 wells drilled. Only 2 of these were drilled in the past 15 years. Ten townships have never had a test well drilled for oil and/or gas. This "LOW" pace of drilling is expected for the next 15 years also and would be accelerated only if one of the 2 predicted wells should make a discovery or if a discovery is made within 30 miles of CRNG lands.

Total predicted wells to be drilled within the CRNG area (not necessarily on CRNG land) are: 2 wells if both are dry holes and no discovery occurs within thirty miles; 7 wells if a discovery occurs within 30 miles but not within the 15 township area encompassing the CRNG; and 30 wells if a discovery occurs within the 15-township area.